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Atmospheric CO_2 drawdown via enhanced basalt weathering - an Austrian perspective

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Enhanced weathering through basalt application on agricultural land represents a proposed strategy for the removal of carbon dioxide from the atmosphere. Co-benefits related to soil health, resilience and crop yield make basalt excellently suited as a sustainably technology for GHG mitigation in agriculture. It has been shown that enhanced weathering is principally feasible on a global scale [1], but it remains unclear how it can be implemented on a local level. With this in mind, we estimate the potential for CO_2 removal through a case study for Austria. Scenarios are estimated for three different particle size distributions (< 100 µm, < 10 µm and < 1 µm). We find that transport related emissions might cancel out any drawdown if grain sizes (< 100 µm) are used. However, under optimal transport conditions the large-scale application of particles with a diameter < 10 µm may remove about 2% of Austria's annual Greenhouse gas emissions while at the same time supplying important plant nutrients [2]. We discuss challenges towards this goal, including the enormous amounts of basalt needed and the energy requirement related to grinding, as well as uncertainties related to actual field weathering rates. Those uncertainties hinder the precise quantification of CO_2 drawdown as of now. While enhanced weathering remains a promising path for climate change mitigation, further research at laboratory and field scale is required to put this technology to optimal use.

[1] Beerling, D. J. et al. (2020). Nature 583, 242–248. *doi.org/10.1038/s41586-020-2448-9*

[2] Rinder, T. & von Hagke, C. (2021) Preprint under Review in J. Clean. Prod. *doi.org/10.31223/X51G76*